PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference ACRY60.PCT	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2007/003390	International filing date *(day/month/year)* 08 February 2007 (08.02.2007)	Priority date *(day/month/year)* 08 February 2006 (08.02.2006)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant ACRYMED, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 12 August 2008 (12.08.2008)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Philippe Becamel e-mail: pt12.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TROUTMAN SANDERS LLP
MARY ANTHONY MERCHANT, PH.D.
BANK OF AMERICA PLAZA
600 PEACHTREE STREET, N.E., SUITE 5200
ATLANTA, GA 30308-2216

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing (*day/month/year*)	21 DEC 2007
Applicant's or agent's file reference ACRY60.PCT	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date (*day/month/year*)	Priority date (*day/month/year*)
PCT/US07/03390	08 February 2007 (08.02.2007)	08 February 2006 (08.02.2006)

International Patent Classification (IPC) or both national classification and IPC

IPC: Please See Continuation Sheet
USPC: 427/337;428/560;977/777

Applicant

ACRYMED, INC

1. This opinion contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis(b)* that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	26 October 2007 (26.10.2007)	Michael Cleveland Telephone No. (571) 272-1700

Form PCT/ISA/237 (cover sheet) (April 2005)

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PCT/US07/03390

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material

☐ on paper

☐ in electronic form

c. time of filing/furnishing

☐ contained in the international application as filed.

☐ filed together with the international application in electronic form.

☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

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Box No. V Reasoned statement under Rule 43 *bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-20,27	YES
	Claims 21-26,28-33	NO
Inventive step (IS)	Claims NONE	YES
	Claims 1-33	NO
Industrial applicability (IA)	Claims 1-33	YES
	Claims NONE	NO

2. Citations and explanations:

Please See Continuation Sheet

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the questions whether the claims are fully supported by the description, are made:

Claims 1-20, 32, and 33 are objected to under PCT Rule 66.2(a)(v) as lacking clarity under PCT Article 6 because claims 1, 9, 11, 17, 19, 32,and 33 are indefinite for the following reason(s):

The term "sufficient" in claims 1, 9, 11, and 19 is a relative term which renders the claim indefinite. The term "sufficient" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The other dependent claims do not cure the defects of the claims from which they depend.

The term "effective" in claims 1, 9, 11, and 19 is a relative term which renders the claim indefinite. The term "effective" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The other dependent claims do not cure the defects of the claims from which they depend.

Claim 17 recites the limitation "contacting the elastomeric surface" in step (c) of the claim. There is insufficient antecedent basis for this limitation in the claim as no previous mention of an "elastomeric surface" appears in the claims it depends from, only a "surface". Further, claim 18 goes on to recite a series of materials (steel, glass, metals) which are not elastomeric.

Claim 32 recites the limitation "the polymer" in the first line. There is insufficient antecedent basis for this limitation in the claim as no mention of a "polymer" appears in claim 28 from which it depends. Based on the recitation appearing in claims 31, the examiner is interpreting "the polymer" as a constituent of "the stabilizing agent".

Claim 33 recites the limitation "surfactant" in the first line. There is insufficient antecedent basis for this limitation in the claim as no mention of a "surfactant" appears in claim 28 from which it depends. Based on the recitation appearing in claims 31, the examiner is interpreting "the surfactant" as a constituent of "the stabilizing agent".

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Supplemental Box
In case the space in any of the preceding boxes is not sufficient.

Continuation of IPC:
B05D 3/04(2006.01),**3/10**(2006.01);**B22F 7/04**(2006.01),**7/08**(2006.01);**B32B 15/02**(2006.01)

V. 2. Citations and Explanations:
Claims 21- 24, 26, 28-31, and 33 lack novelty under PCT Article 33(2) as being anticipated by Bharathi et al ("Sol-gel-derived Nanocrystalline Gold-silicate Composite Biosensor" in Analytical Communications, January 1998, Vol 35 pgs 29-31; hereafter Bharathi).

Claims 21, 22, 24, 28, 29, 31, and 33: Bharathi teaches a method of making gold nanoparticles embedded in a gold-dispersed sol-gel film comprising adding in no particular order, an aqueous solution of a stabilizing agent solution ((N-[3-(Trimethoxysilyl) propyl] ethylene diamine (EDAS), (a tertiary diamine solution), an anionic donating solution (0.1 M HCL and water), a soluable metal salt solution (hydrogen tetrachloroaurate), and adding a reducing solution (0.3 M $NaBH_4$), optionally an additional stabilizing agent ((Methyltrimethoxysilane) (nonionic surfactant)) added (pg 29 second column).
Claim 23, 30: Bharathi further teaches the sol being solidified by drying at 50-60°C (page 29 second column)
Claim 26: Bharathi further teaches forming the nanoparticles in situ on the surface of an article (the sol is applied to an ITO substrate then fired to yield the gold nanoparticle embedded film) (page 29 second column).

Claims 21-26, and 28-32 lack novelty under PCT Article 33(2) as being anticipated by Jungahn et al (EP 1388561; hereafter Jungahn).

Claims 21, 22, 24, 25, 28, 29, 31-32: Jungahn teaches a method of making nano-sized metal particles (see, for example, Ag, Au, Pd, Pt, Cu, etc., [0021]) which are self assembled by mixing block copolymers and film casting (abstract). The method comprises adding in no particular order, an aqueous solution of a stabilizing agent solution (a variety of copolymer systems with chain-end functionalized polymers comprising, for example, methyl methacrylates, vinylpyridine, tertiary amines, and tertiary diamines, and mixtures, etc [0011-0016]), an anionic donating solution (see, for example, water, [0061]), a soluable metal salt solution (see for example, $FeCl_2$, K_2PtCl_4, $HAuCl_4$, K_2PdCl_4, etc. [0058 - 63]), and adding a reducing solution (see for example, 0.4 M $NaBH_4$ [0061-0062]).
Claim 23, 30: Jungahn further teaches heating the solution (see, for example, heating the vial containing the solution to 60°C, [0058]).
Claim 26: Jungahn further teaches forming the nanoparticles in situ on the surface of an article (the solutions can be film cast, see, for example, [abstract, 0065-0066]).

Claims 21-24, and 27 lack novelty under PCT Article 33(2) as being anticipated by Park et al (US 2004/0253536 A1; hereafter Park).

Claim 21, 24: Park teaches a method of making metal nanoparticles comprising adding in no particular order, an aqueous solution of a stabilizing agent solution (optionally in the presence of a surfactant including a sodium oleate (surfactant) for stabilizing particles),

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Supplemental Box
In case **the space in any of the preceding boxes is not sufficient.**

an anionic donating solution (water) and a soluble metal salt solution (solution containing ions of a metal, see, for example, $AgNO_3$), and adding a reducing solution (the solution is reduced with a reducing agent) ([0026], [0046 - 0050]).

Claim 22: Park further teaches wherein the metal nanoparticles comprise gold, silver, copper, palladium, and platinum ([0046 - 0050]).

Claim 23: Park further teaches heating the final solution (see, for example, in preparing copper nano-particles, the solution is refluxed at 70-90°C, [0026]).

Claim 27: Park further teaches extracting the nanoparticles into a nonaqueous solution (see, for example, [0047], where after filtering the nanoparticles were dispersed in an organic toluene).

Claims 1-6, 9, and 10 lack an inventive step under PCT Article 33(3) as being obvious over Park.

Claims 1, 6: Park teaches a composition comprising metal nanoparticles can easily form a conductive film or pattern having excellent conductivity, and thus can be applied for antistatic washable sticky mats or shoes, conductive polyurethane (elastomeric) printer rollers, electromagnetic interference shielding, etc. (abstract, [0041]).

Park teaches that coating the metal nanoparticle composition onto the substrate can be accomplished by any conventional coating method. For example, for spin-coating, the spin rate is determined depending on viscosity or the coating composition, desired film thickness and desired conductivity ([0041]).

Following a conventional deposition process, the coating under goes a prebake, then a developing process is conducted to pattern the coating, where exposed portions of the coating become insoluable, and non-exposed portions remain soluable, so only the exposed portions remain on the substrate ([0042]). Thus it would be suggested that the developing process would use a rinsing step, as the "soluble" portions are removed.

Claim 2: Park teaches a method of preparation of metal nanoparticles involving adding in no particular order, an aqueous solution of a stabilizing agent solution (optionally in the presence of a surfactant including sodium oleate for stabilizing particles), an anionic donating solution (water) and a soluble metal salt solution (solution containing ions of a metal, see, for example, $AgNO_3$), and adding a reducing solution (the solution is reduced with a reducing agent) ([0026], [0046 - 0050]).

Claim 3: Park further teaches wherein the metal nanoparticles comprise gold, silver, copper, palladium, and platinum ([0046 - 0050]).

Claim 4: Park further teaches heating the final solution (see, for example, in preparing copper nano-particles, the solution is refluxed at 70-90°C) [0026]).

Claim 5: Park teaches that coating of the nanoparticle containing composition can be applied by any conventional coating method ([0041]). One of ordinary skill in the art would appreciate that multiple layers of the same coating, or alternating coatings could be predictably achieved by repeating the same steps of a process. So it would have been obvious to one of ordinary skill in the art at the time of invention to have repeated the application steps to obtain the predictable result of adding additional layers.

Claim 9, 10: Park teaches antistatic washable sticky mats or shoes, conductive polyurethane printer rollers, electromagnetic interference shielding, etc. made by applying a composition comprising metal nanoparticles which form a conductive film or pattern having excellent conductivity, (abstract, [0041]). Park teaches that coating the metal nanoparticle composition onto the substrate can be accomplished by any conventional coating method. For example, for spin-coating, the spin rate is determined depending on viscosity or the coating composition, desired film thickness and desired conductivity ([0041]).

Following a conventional deposition process, the coating under goes a prebake, then a developing process is conducted to pattern the coating, where exposed portions of the coating become insoluble, and non-exposed portions remain soluble, so only the exposed portions remain on the substrate ([0042]). Thus it would be suggested that the developing process would use a rinsing step, as the "soluble" portions are removed.

Claims 7, 8 lack an inventive step under PCT Article 33(3) as being obvious over Park in view of Grivna et al (US 5,453,401; hereafter Grivna).

Claim 7: Park teaches the method of claim 1 (as discussed above), where a layer of metallic nanoparticles has been applied to an elastomeric surface to form a metallic overlayer, but Park does not explicitly teach contacting the elastomeric surface with metallic nanoparticles adhered thereto with an aqueous solution of hydrogen peroxide for a sufficient period of time, and rinsing the hydrogen peroxide solution from the surface. Grivna teaches a method of reducing the corrosion of a metal surface involving exposing the surface to an aqueous solution of hydrogen peroxide prior to rinsing with distilled water (col 3 lines 4 - 35). As the elastomeric surface becomes coated with metallic nanoparticles, as taught by Park, a metallic outer surface now exists on the substrate. Incorporating a step of exposing the surface to an aqueous solution of hydrogen peroxide prior to rinsing with distilled water would reduce the corrosion of the newly formed metallic nanoparticle coated surface. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have applied an aqueous solution of hydrogen peroxide followed by a distilled water rinse as taught by Grivna, to the nanoparticle coated surface as taught by Park for the purpose of aiding the corrosion resistance of the applied metallic nanoparticle coating.

Claim 8: Park teaches a composition comprising metal nanoparticles can easily form a conductive film or pattern having excellent conductivity, and thus can be applied for antistatic washable sticky mats or shoes, conductive polyurethane printer rollers, electromagnetic interference shielding, etc. (abstract, [0041]).

Claims 11, 13, 15, 16, 19, 20 lack an inventive step under PCT Article 33(3) as being obvious over Yadav et al. (US 2005/0008861 A1; hereafter Yadav) in view of Iler (US 3,485,658; hereafter Iler).

Claim 11, 13: Yadav teaches that nanoparticles comprising silver (doped or undoped) can be useful in anti-microbial and anti-bacterial applications when they incorporated into or as coatings on a variety of surfaces ([0097-0100], [0126-0130], [0148]). Yadav

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Supplemental Box
In case the space in any of the preceding boxes is not sufficient.

teaches that a coating, or film comprising metallic nanoparticles / nanopowder (a zinc, copper and/or silver precursor may be mixed to yield doped silver powders for anti-microbial applications) can be formed by preparing a dispersion of fine nanoparticles and applying it by various known methods ([0055], abstract), but the specifics of these known methods are not taught. Iler teaches a method of forming a monolayer or multiple monolayers of colloidal particles on a substrate, where the particles are laid down on the substrate from a dispersion of particles, then the dispersion in excess of the monolayer is rinsed off (col 3 lines19 - 27). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have applied the dispersion of metal nanoparticles taught by Yadav by the process taught by Iler as Yadav is silent beyond teaching that a known method of deposition should be used, and Iler provides such a known method. When a primary reference is silent as to a certain detail, one of ordinary skill would be motivated to consult a secondary reference which satisfies the deficiencies of the primary reference.

Claim 15: Iler further teaches that within the coating method, that additional monolayer coatings can be applied and the excess rinsed off until the desired coating is built up col 3 lines 19 - 32, Fig 3).

Claim 16: Yadav further teaches silver comprising nanoparticles can be incoporated on plastics, glass, ceramics, metals, etc [0127-128].

Claim 19, 20: Yadav teaches a variety of articles (see, for example, food packaging) which are coated with nanoparticles comprising silver (doped or undoped) as the coating useful in anti-microbial and anti-bacterial applications ([0097-0100], [0126-0130], [0148]). Yadav teaches that a coating, or film comprising metallic nanoparticles / nanopowder (a zinc, copper and/or silver precursor may be mixed to yield doped silver powders for anti-microbial applications) can be formed by preparing a dispersion of fine nanoparticles and applying it by various known methods ([0055], abstract), but the specifics of these known methods are not taught. Iler teaches a method of forming a monolayer or multiple monolayers of colloidal particles on a substrate, where the particles are laid down on the substrate from a dispersion of particles, then the dispersion in excess of the monolayer is rinsed off (col 3 lines19 - 27). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have applied the dispersion of metal nanoparticles taught by Yadav by the process taught by Iler as Yadav is silent beyond teaching that a known method of deposition should be used, and Iler provides such a known method. When a primary reference is silent as to a certain detail, one of ordinary skill would be motivated to consult a secondary reference which satisfies the deficiencies of the primary reference.

Claims 12,14 lack an inventive step under PCT Article 33(3) as being obvious over Yadav in view of Iler and further in view of Park.

Claim 12: Yadav in view of Iler teaches the method of claim 11 (described above), and additionally Yadav teaches that for purposes of applying coatings comprising metal nanoparticles, that the nanoscale or submicron powders may be produced by any method ([0035]). Yadav teaches a method of forming metallic nanoparticles involving a high temperature reactor [0057-0059], but neither Yadav nor Iler teach the metal nanoparticles are made by a method comprising, adding in no particular order, an aqueous solution of a stabilizing agent solution, an anionic donating solution and a soluble metal salt solution, and adding a reducing solution. Park teaches a method of preparation of metal nanoparticles (gold, silver, copper, palladium, and platinum ([0046 - 0050])) involving adding in no particular order, an aqueous solution of a stabilizing agent solution (optionally in the presence of a surfactant including sodium oleate for stabilizing particles), an anionic donating solution (water) and a soluble metal salt solution (solution containing ions of a metal, see, for example, AgNO3), and adding a reducing solution (the solution is reduced with a reducing agent) ([0026], [0046 - 0050]). It would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated the method of preparing the metal nanoparticles as taught by Park into the method of coating as taught by Yadav and Iler as Yadav teaches that that metal nanoparticles used to coat can be made from any method, and by using a solution based method one could avoid using the energy to operate a high temperature reactor.

Claim 14: Park further teaches heating the final solution (see, for example, in preparing copper nano-particles, the solution is refluxed at 70-90oC, [0026]).

Claims 17, 18 lack an inventive step under PCT Article 33(3) as being obvious over Yadav in view of Iler and further in view of Grivna.

Claim 17: Yadav in view of Iler teach the method of claim 11, where a layer of metallic nanoparticles has been applied to an elastomeric surface to form a metallic overlayer, but neither Yadav nor Iler explicitly teach contacting the surface with nanoparticles adhered thereto with an aqueous solution of hydrogen peroxide for a sufficient period of time, and rinsing the hydrogen peroxide solution from the surface. Grivna teaches a method of reducing the corrosion of a metal surface involving exposing the surface to an aqueous solution of hydrogen peroxide prior to rinsing with distilled water (col 3 lines 4 - 35). As the elastomeric surface becomes coated with metallic nanoparticles, as taught by Yadav in view of Iler, a metallic outer surface now exists on the substrate. Incorporating a step of exposing the surface to an aqueous solution of hydrogen peroxide prior to rinsing with distilled water would reduce the corrosion of the metallic nanoparticle coated surface. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have applied an aqueous solution of hydrogen peroxide followed by a distilled water rinse as taught by Grivna, to the nanoparticle coated surface as taught by Yadav and Iler for the purpose of aiding the corrosion resistance of the applied metallic nanoparticle coating.

Claim 18: Yadav further teaches silver comprising nanoparticles can be incorporated on plastics, glass, ceramics, metals, etc [0127-128].

Claims 1-33 meet industrial applicability as defined by PCT Article 33(4), as the subject matter claimed can be made or used in industry.